

Orthodontic Brackets As Intermaxillary Fixation: A Case Report

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Abstract

Mandibular fracture is relatively less common in children compared to adults. Management of mandibular fracture in children is a very complex issue and requires accurate and early treatment. Intermaxillary fixation is an integral part for the management of facial bone fractures. Conventional methods have drawbacks such as the risk of transmission of blood-borne diseases, stressful procedure and damage to teeth and periodontium. Orthodontic bracket fixation is an effective alternative method for Intermaxillary fixation in the management of fracture of facial bones as it overcomes every drawback of conventional Intermaxillary fixation method and gives a very stable occlusal and functional outcome. This case report describe a conservative way of management of moderately displaced mandibular condylar fracture with the help of closed reduction achieved using intermaxillary fixation (IMF) with the help of elastics using orthodontic brackets.

Keywords: Orthodontics, Intermaxillary Fixation, Mandibular Fracture, Orthodontic Brackets

Introduction

Trauma to the maxillofacial region in pediatric population affects the physical and mental well-being along with deterioration of function, esthetic appearance, growth, and development. The overall prevalence of pediatric facial fractures is much less than the adult population.¹ The most commonly involved bone in pediatric facial fracture is mandible, in more than 50% of the cases.² The most commonly involved sites in mandible are: condyle followed by angle, symphysis, and the body.^{3,4} Fall is the major cause of mandibular fracture in pediatric population.⁵

Management of facial bone fractures has always been a point of debate. Recent management techniques lay emphasis on open reduction and internal fixation (ORIF). Intermaxillary fixation (IMF) is an integral part of the management of facial bone fractures, whether the treatment modality is ORIF or conservative management. In the later IMF is usually carried out using an arch bar and ligature wire. The factors which complicate the treatment of mandible in pediatric patients are the presence of tooth buds of permanent teeth, jaws in a growth phase, the anatomy of deciduous teeth not ideal for various types of wiring technique to achieve IMF and compliance of the patient. Due to these reasons, ORIF is not recommended⁶, and it is associated with a negative effect on skeletal development and teeth. Therefore, a conservative approach for management of mandibular fractures in pediatric patients is recommended.⁷ In this case report, an alternative method of IMF was used for conservative management of condylar fracture of the mandible in a 7-year old child with the help of orthodontic brackets and elastics.

Case Report

A 7-year old male child patient reported to us with a complaint of trauma to the lower jaw after being involved

in a motorcycle accident 3 days before. The child had a history of loss of consciousness for a minute. There was neither nasal nor ear bleeding. The child was well oriented, cooperative, and little anxious. Later he was taken to nearby hospital for the first aid and radiography (PA view). Then it was further referred to the dental treatment. The medical or dental history revealed was not significant.

On clinical examination, there was swelling over the right lower third of the face. Mouth opening and TMJ movements were normal (Figure 1 &2). On palpation, there was tenderness in the right body region of the mandible. On examination, there was ecchymosis on the right lower third of the face, lower eye lid and sclera of the eye with healing abrasions extra orally. Intraorally buccal mucosa with respect to 84, 85, and 46 was obliterated with ecchymosis (Figure 3&4). Later it was advised for CT scan. Clinical and CT scan evaluation revealed right subcondylar fractures with occlusal derangement(Figure 5&6). Occlusion was deranged with midline shift to right.

Based on this finding, conservative approach was chosen for management with closed reduction. Hence, we decided to use orthodontic brackets along with elastics for stabilization of fracture segments with the help of IMF. Only the primary molars (multirooted) were considered for the placement of orthodontic brackets to avoid subluxation of the deciduous teeth. Orthodontic brackets were placed on both the jaws to achieve a good

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Figure 1: Extra oral view



Figure 2: Extra oral view



Figure 3,4: Intra oral view

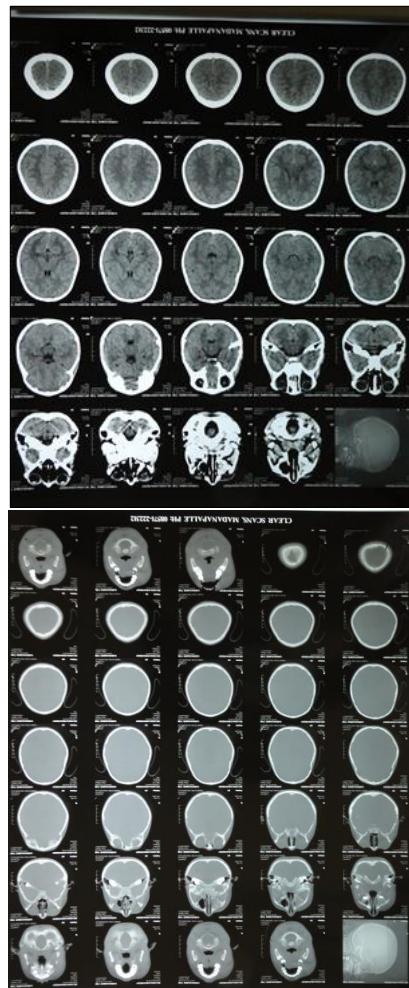


Figure 5 &6: CT scan

IMF (Figure 7). The teeth which were chosen were 54, 55, 64, 65, 74, 75, 84, and 85. Stainless steel brackets with hooks were placed and bonded with standard technique over these teeth. After placement of brackets, the fracture segments were manually reduced and brought into occlusion. Orthodontic traction elastics were used to achieve adequate occlusion (Figure 8). IMF was done with the help of tight elastics placed from upper jaw bracket hook to lower jaw bracket hook. Elastics were kept in place for 24 hrs. IMF was retained for a period of 21 days. Oral antibiotics and analgesics were prescribed along with mouth wash. The child was discharged with following instructions: To avoid mouth opening, to be on a liquid diet, to keep his mouth clean, and to avoid any type of fermentation to the maxillofacial region.

The child was recalled after 1 week for evaluation. During 1 week followup, the extraoral swelling had totally subsided, and the laceration over the lower lip had adequately healed. All the brackets were intact with good IMF with elastics. The occlusion was intact. The overall oral hygiene was good. The elastics were changed to maintain adequate IMF traction. The patient was again recalled after 2 weeks for a reassessment of the healing of the fracture of the mandible. On clinical examination,



Figure 7: Placement of orthodontic brackets



Figure 8: Intermaxillary fixation using elastics

there was no mobility and tenderness was also absent. IMF elastics were released and debonded of the orthodontic bracket was done. During this period also, the oral hygiene was well maintained. Postoperative revealed complete healing. As the patient had multiple carious teeth, he was called for dental treatment after 3 days.

Discussion

The mandible is most commonly involved bone in maxillofacial trauma in pediatric patients. Although the pattern and clinical features are similar, treatment modalities are different when compared to adult mandibular fracture. The pediatric fracture has the advantage of better healing capacity, remodeling potential, the high recovery rate of tissues, and better vascularization. Disadvantages include the presence of developing tooth buds, transitional dentition, and developing skeletal structures. Therefore, the treatment protocol for pediatric fracture should utilize the advantages and minimize the disadvantages. These factors lead to a conservative approach for the treatment of mandibular fracture in the pediatric population.

Various treatment options are present which can be utilized according to the age, dentition status, pattern of injury, and site of the fracture. For green stick fracture, no intervention is needed except for child is put on a soft or liquid diet along with a prescription of antibiotics and analgesics, closed reduction with the help of interdental wiring. For moderately displaced fractures: open or closed cap splints along with circummandibular wiring. Intermaxillary fixation is utilizing arch bars and eyelets can be used. Disadvantages of these techniques include: require laboratory procedures for construction of splints,

because of the anatomy of primary teeth and transitional stage of dentition it is not ideal for the pediatric population, maintenance of oral hygiene is difficult, patients compliance, and psychological effect in early age.⁸ For severely displaced fractures, or multiple fractures ORIF is recommended.

In this case, based on clinical examination right condylar fracture of the mandible was suspected and was confirmed using CT scan. The option of closed reduction with the help of arch bar wiring or eyelets was discarded due to the fact that multiple carious teeth and few permanent teeth. Hence, finally, we decided to manage this case with closed reduction with the help of orthodontic brackets and elastic traction. The procedure was easily performed; the patient was fully cooperative during the procedure. The procedure was completed within 30 min. Adequate traction was maintained during IMF leading to complete immobilization and stabilization of the fracture⁹ segments for adequate bone healing was the plus point of this technique, it was easy to maintain oral hygiene, as the technique was performed involving only the facial surfaces of the primary teeth. The technique was cost-effective, and no special instrumentation was needed.

The disadvantages observed for this procedure was the need for a repeated change of the elastics for maintenance of uniform traction. There is a little technicality for the procedure, as wrong direction traction will lead to subluxation of the tooth. This procedure is recommended in pediatric age group 7-years and above. This procedure has little applicability in cases of the comminuted or severely displaced fractures and fractures in the edentulous region especially angle region.

Pediatric mandibular condylar fractures can be easily overlooked by physicians. Most mandibular condylar fractures involve the condylar neck, with a few reports of intracapsular fractures.¹⁰ Direct impact usually leads to a unilateral fracture because the weak condylar neck breaks easily,¹¹ and there is no intracranial displacement.¹² In that light, a definitive diagnosis of condylar fractures is possible only with a radiologic investigation.¹³ The use of an arch bar and wire, followed by intermaxillary fixation, is an option for treatment of such fractures.¹⁴⁻¹⁶

Disadvantages of arch bar intermaxillary fixation include an unacceptably high glove perforation rate associated with arch bar placement, risk of blood-borne pathogen infection in maxillofacial trauma, need for general anesthesia to place the arch bars, the effects of the arch bar on dental enamel and gingiva, increased discomfort, prolonged treatment, poor oral hygiene, and the likelihood of gingival injury.^{16, 17} The orthodontic bracketing that we used offered an acceptable and less threatening procedure to a pediatric patient and resulted in high patient comfort and acceptance. The use of elastics for fixation in this patient was not intermaxillary fixation in the strict sense of the word since there was some functional activity and he could remove the elastics at least once a day. However, the guiding elastics did

appear to be rigid enough to impart a stable fixation force for the condyles to heal. Most previous reports in the literature have focused on the treatment of unilateral condylar fracture.¹⁷⁻²¹ The majority of these condylar fractures were unilateral and followed for a shorter period (because of compliance problems with follow-up appointments).

In comparison with open reduction or intermaxillary fixation techniques, this conservative technique is reliable, easy to handle, and cost-effective. There is also maximum stability during the healing period, with minimal trauma to adjacent anatomic structures and high tolerance in young patients.

Intermaxillary fixation is an essential part of the management of fractures of facial bone. Fracture of jaw bones is managed more commonly with ORIF, due to the advancement of surgical techniques and instruments used for osteosynthesis. IMF can be used alone or in association with ORIF in the treatment of fractures of maxilla and mandible. The conventional method of doing IMF using the arch bar and wires have drawbacks like trauma to periodontium, risk of blood-borne diseases transmission, demanding and painful procedure, need of local anesthetic and its related complications and difficulty in oral hygiene maintenance. These drawbacks lead us to use alternative methods for IMF.

We used orthodontic brackets for IMF in a patient with multiple fractures of maxilla and mandible. These brackets were of the type routinely used for fixed appliance therapy in orthodontics for correction of maligned teeth. These brackets are low cost and easily available. He had difficulty in mouth opening and occlusal discrepancy. Placement of brackets was easy, and the operator could avoid contact with the intra oral fluids that can lead to transmission of blood-borne diseases. We used traction elastic on selected teeth so as to attain maximum alignment of occlusion. Within 24hrs we were able to achieve stable occlusion. During this period patient experienced no discomfort. After 21 days Intermaxillary fixation was removed and, the patient underwent physiotherapy for 2weeks. We achieved complete occlusal and functional stability using IMF with orthodontic brackets in this patient.

Conclusions

Intermaxillary fixation using orthodontic brackets and intermaxillary elastics is an effective alternative method that nullifies all the drawbacks of Intermaxillary fixation with arch bar and wire. We strongly recommend the use of orthodontic brackets in Intermaxillary fixation (IMF) as management some pediatric mandibular condylar fractures.

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